Does gender influence portfolio selection for financial institutions?

A Thesis Submitted to the
College of Graduate and Postdoctoral Studies
In Partial Fulfillment of the Requirements
For the Degree of Master of Science in Finance
In the Department of Finance and Management Science
University of Saskatchewan
Saskatoon, Saskatchewan, Canada

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Abstract

Abstract: Gender stereotypes can influence different investors' perceptions and expectations between male and female led firms. Using institutional ownership data for U.S. S&P 500 companies from 2001 to 2017, we examine how CEO gender affects institutional investment decisions. We find that passive (as opposed to active) institutions invest greater proportions of their portfolios in firms with male CEOs compared to those with female CEOs. One explanation for this result is the stereotype that leadership skill is perceived to be a masculine trait. On the other hand, we find no evidence that the fraction of female board members affects the portfolio weights, so the result applies strictly to female leadership, and not to female representation. We also find that passive institutions run by female CEOs tend to invest smaller proportions of their portfolios in each firm, so institutions with female CEOs tend to diversify more than those with male CEOs. This finding suggests that female CEOs of financial institutions are more financially risk-averse than male CEOs. These results imply that gender is an important factor that affects passive institution investment choices, and they illustrate a systematic bias against investing in female led firms.

Key words: Passive institutional investor; CEO gender; Stereotype

Acknowledgments

I would like to express my greatest appreciation to my supervisors, Dr. Min Maung and Dr. Craig Wilson. This work would not be completed without their instruction in each step I have taken. I would also like to thank my examination committee members for their helpful comments.

I shall extend my gratefulness to all the professors from the Department of Finance and Management Science. The past two years is an amazing journey for me.

Last but not least, great thanks for my family and friends, for their love and support.

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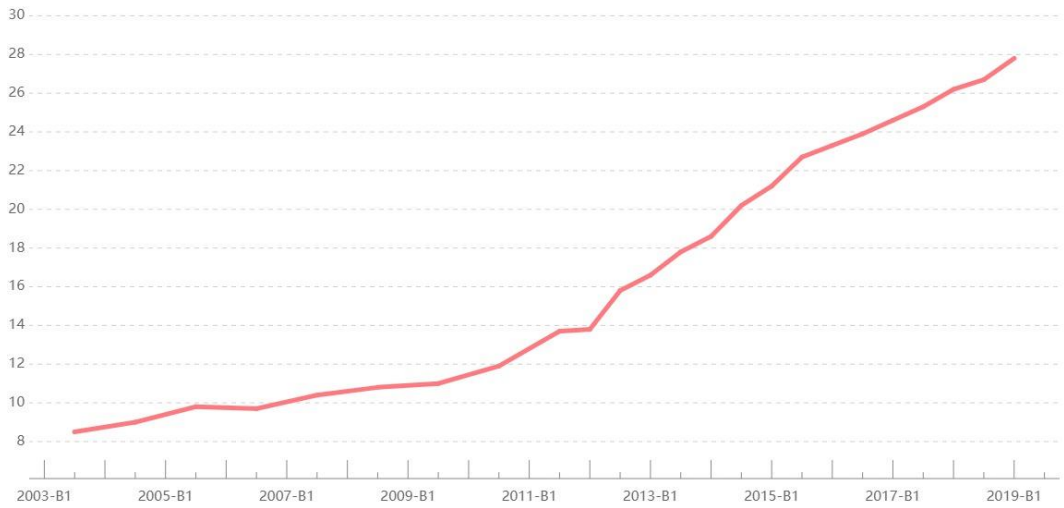
1. Introduction

Male CEOs remain the norm in the business world. The number of female CEOs in the *Fortune* 500 remained 24 in May 2018, after it reached its historic high in 2014. In other words, only 4.8% of the *Fortune* 500 firms have female CEOs.[1] However, under public pressure, many firms have to increase gender diversity on their boards. Moreover, a number of European countries have passed legislation mandating more female board representation for publicly traded firms. Increasing female board representation could be the first step to have more female CEOs in the business world.

According to the Higgs report (Higgs, 2003), increasing gender diversity could boost board effectiveness. In Sweden, it is legally required that at least 25% of the board members are women (Medland, 2004). Similarly, Norway carried out the most extreme promotion of gender diversity. In 2006, it was legislated that all listed companies must comply with a 40% gender quota for women on board, and firms were given two years to adjust. Spain also followed Norway's step by making legislation requiring companies to have 40% female directors by 2015. In Figure 1.1, we can see the percentage of female presidents, board members and employee representatives increased dramatically from 2003 to 2019 in the EU, with the highest record around 28% in 2019.Figure 1.2 shows the percentage of female CEOs, executives and non-executives in the EU. Although the percentage kept increasing from 2012, the percentage is still relatively low: about 17.8% listed firms have female CEOs, executives and non-executives.

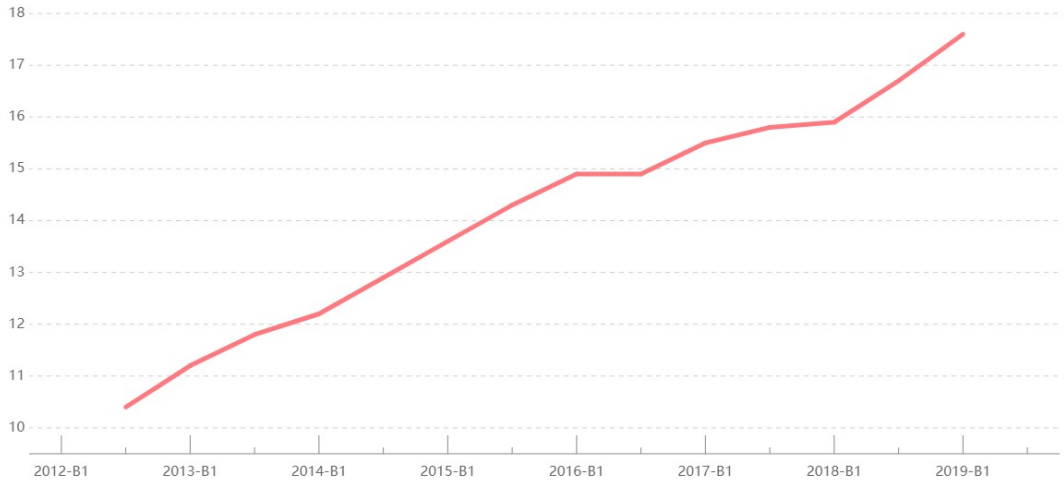
[1] https://fortune.com/2017/06/07/fortune-500-women-ceos/

Figure 1.1 The change in percentage of female presidents, board members and employee representatives from listed companies in EU 28 countries



EIGE' s Gender Statistics Database - Indicator:Largest listed companies: presidents, board members and employee representatives
Source: European Institute for Gender Equality.
IMPORTED ON: 14.02.2017

Figure 1.2 The change in percentage of female CEOs, executives and non-executives from listed companies in EU 28 countries

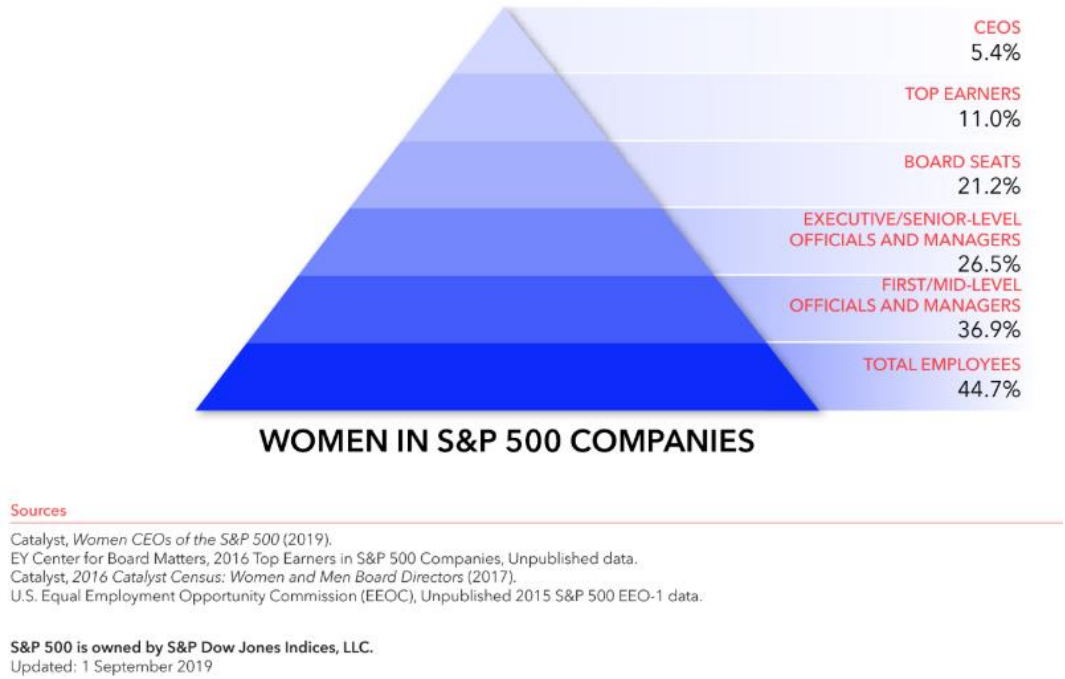


EIGE' s Gender Statistics Database - Indicator:Largest listed companies: CEOs, executives and non-executives
Source: European Institute for Gender Equality.
IMPORTED ON: 14.02.2017

Following European countries' step, the trend of accelerating gender diversity on boards has expanded to the U.S. For Russell 3000 listing companies, 45% of new directors are women in 2019. That percentage in 2018 was 34%. However, similar change is not seen with female CEOs. In Figure 1.3 we see that although women take 21.2%

of the board seats in S&P 500 companies in 2019, only 5.4% of companies have female CEOs.[2] Female CEOs are rare to the investors, so those involved in the market become interested in the impact the female CEOs will have on the firms.

Figure 1.3 Pyramid: Women in S&P 500 Companies



Previous studies suggest that top managers' characteristics influence firms' policies such as finance and investment. (Cain & Mckeon, 2016; Cronqvist et al., 2010). To test if women are associated with risk-averse characteristic in the finance industry, research show that women are more conservative investors compared to men (Carter et al., 2003; Charness & Gneezy, 2012; Bernasek & Shiwff, 2001). It is worth understanding how women's risk-averse characteristic influences investors' view on top female managers, considering the representation of women on boards is increasing. Institutional investors are major players in the U.S. market. Institutional ownership of the market started growing up roughly 50 years ago. In the 1990s, institutional investors were estimated to own 45% of all outstanding equity. This number was 33% in the 1980s and only 8% in 1950. According to Bloomberg, institutional investors owned 80.3% of the S&P 500 index

[2] Catalyst, Pyramid: Women in S&P 500 Companies (September 1, 2019).

and 80.2% of the S&P 1500 composite index in 2017. Thus, our focus is on how CEO gender affects institutional investors' investment decisions.

Shleifer and Vishny (1986) find that large shareholders have an incentive to monitor managers because of their significant economic stakes, so institutional investors changed from just passive investors to active monitors. To enhance managerial accountability, institutions could change the composition of investee firms' boards. In 2017, State Street Global Advisor, which is the world's third-largest asset manager, began pressuring companies on gender diversity at the board level. This asset management firm carried out the board diversity program. It asked firms to meet its gender diversity criteria, or State Street would vote against the entire slate of board members on the nominating committee.[3]

Institutional investors already started influencing the female representation in investee firms' board rooms. Chen et al. (2007) investigate institutions that practiced monitoring and categorize institutional investors into two types: "grey" institutional investors and independent investors. Since these two types of institutions have different incentives to monitor investee firms, we would like to know whether and how gender impact their investments.

Previous studies show that gender did influence independent institutional investors' decisions. Francis et al. (2017) carry out a study that focused on activist hedge funds, which is a type of an independent institutional investor. They believe hedge funds prefer investee firms with female CEOs because of the differences in managerial and leadership styles between female and male CEOs. Although we know what independent institutional investors want, we still do not know "grey" institutional investors' preference. Therefore, the research gap exists. We would like to address the gender preference of "grey" institutional investors.

In this paper, we study 25,038 passive institutional ownership data of U.S. S&P 500

[3] https://www.institutionalinvestor.com

companies from 2001 to 2017.[4] The portfolio weight is used to measure institutional investors' willingness to invest in different firms, and we create gender dummy variables for both investee firms and institutional investors as our key explanatory variables. We obtain the institutional holding data from the Thomson Reuters 13F database, and the CEOs' genders are gathered from BoardEx. Following previous studies, we control for the investee firms' and CEO's characteristics. Based on our sample, we find that passive institutions invest greater proportions of their portfolios in firms with male CEOs compared to those with female CEOs.

Our result shows that institutions run by female CEOs are likely to invest smaller proportions of their portfolios to each firm, which is consistent with the stereotype that women are risk averse. Also, we test whether passive institutions would take the investee firms' gender diversity on board into account when they make investment decisions. Our result shows that gender diversity on board is not as important as the CEO gender for passive institutions. By dividing our date into two periods, pre-2008 and past-2008, we run the regression separately. Comparing the regression results from these two periods, we notice passive institutions are becoming less discriminating against the female CEOs.

Our research makes the following contributions to the literature. Firstly, based on our research, we are the first to investigate how gender impacts passive institution investment decisions. Thus, this paper would enrich the understanding of institutional investors, especially for passive institutions. Our results show that passive institutions have different gender preferences compared to the independent institutional investors, which also supports the category of institutional investors established by previous literature. Secondly, several world's largest investment institutions carried out a campaign to improve the female representation on board since 2017. With their new guidelines applied to different regions around the world, our findings would help institutions to know the varying needs of different types of institutional investors. Thirdly, this paper focuses on

[4] We follow the category of institutional investors done by Chen et al. (2007) and define the passive institutional investors as the "grey" institutional investors in their research.

the U.S. market. After the legislation of female board seat representative in California, other states will carry out similar regulations or laws modelling California's law. This paper could provide investors with a deeper understanding of female CEOs as well as support the new regulations with a theoretical background. Finally, our results confirm that female CEOs are more risk-averse compared to their male peers. Therefore, we add additional evidence to the research of female CEOs.

The remainder of this study is structured as follows. In Section 2, we summarize previous works of literature and developed our hypotheses. In Section 3, we describe the variables construction and regression model. Section 4 presents our main regression results and robustness test. The conclusion is in Section 5.

2. Literature review

2.1 The effect of managers on firm policies

Some researchers are interested in whether and how individual managers affect corporate behavior and performance. Bertrand and Schoar (2003) construct a manager-firm matched panel dataset to track the top managers across different firms over time. There is evidence that manager fixed effects matter for a wide range of corporate decisions. They conclude that management style is significantly related to managers' fixed effects in performance.

As for risk preference, researchers believe that CEOs' risk-taking has an influence on the firms' decisions. Cronqvist et al. (2010) use a database of CEO's leverage in their most recent home purchases to find a positive relationship between personal home leverage and corporate leverage in the cross-section when examining CEO turnover. This paper empirically supports that CEO's behavioral consistency across personal and professional situations can predict the corporate financial behavior of the firms they manage. In another paper, using a sample of 15,627 firm-years between 1992 and 2009, 1016 of which were led by CEOs who are also recreational pilots, Cain and Mckeon (2016) test for differences in corporate policies, for instance, leverage, acquisitiveness, and related policy choices to overall firm risk. They analyze the relation between CEO personal risk-taking, corporate risk-taking and total firm risk. The researchers demonstrate that CEOs who have private pilot licenses are associated with riskier firms. These kinds of firms usually have higher equity return volatility. And the volatility cannot be fully explained by compensation components that financially incentivize risk-taking. The results imply that managers' nonpecuniary risk preferences revealed outside the firm influence project selection and corporate policies. Substantial evidence supports the finding that CEOs' characters affect firms' decisions and influence risk-taking behavior. This behavior consistency may explain why researchers are interested in testing how top managers' characteristics affect corporate behavior and performance.

2.2 Gender stereotype

Some researchers argue that the barriers to women's advancement in corporate America do not exist. Within the federal government, the evidence shows that women employees are favored in promotion decisions over their male colleagues (Powell & Butterfield, 1994). In contrast, more studies in corporation management state that the number of women executives is still relatively small. From 1987 to 1996, we only find two female CEOs (Daily et al.,1999). Among *Fortune* 500 companies, only 4% of top managers are female, and the ratio of female CEOs is even smaller– less than 0.5%(Catalyst,2001). We could not say there is a trend that female managers are moving into the executive suite. The "glass ceiling" still exists, and it blocks the high-achieving women on the way to the board room, which calls governments' attention to promote legislation to increase the female representatives in corporate governance. In California, a new regulation requires that all boards have at least one female board member in 2019 if their headquarters are in the state. For boards with six members or more, the new regulation also mandates that the firms have at least three women on their boards by 2021. And other states are following California's action. For example, New Jersey comes up with legislation modelled after the California law, while Illinois is debating a bill that mandates gender and ethnic diversity on boards.[5]

To understand the barriers that block women from top management positions, we should learn the differences between women and men firstly. The behavioral differences between them have been addressed widely in the psychology literature (Levin et al., 1988; Feingold, 1994; Costa & McCrae, 2001). Croson and Gneezy (2009) find experimental evidence that supports women are more risk-averse and more reluctant to competition than are men. Similarly, Eckel and Grossman (2002) observe that women are more likely to choose risk-free gambling; however, they do not find women have greater loss aversion compared to men.

Different risk preference is a typical gender stereotype. Biernat and Kobrynowicz (1997) define stereotypes as social judgments of individual group members that lead people to

[5] https://corpgov.law.harvard.edu/2019/06/18/u-s-board-diversity-trends-in-2019/

judge group members consistently and exaggeratedly based on group expectations. Surface-level demographic characteristics usually come along with stereotypes, for example, race and gender. The stereotypes would lead to gender gaps in self-confidence, assessments of others and behavior in cooperation. To explore the effect of gender on self-esteem, Bordalo et al. (2019) conduct three laboratory experiments at Ohio State University, Harvard Business School and the University of California Santa Barbara to collect data on beliefs about self and others' abilities in different domains. They find that stereotyping and overestimation of the ability of both oneself and others are the two sources that shape our beliefs about our ability. The overestimation increases with the difficulty of the questions from experiments. The authors define this phenomenon as difficulty-induced misestimation (DIM). Because of stereotypes, the participants exaggerate the performance gap between different gender. Thus, women become much less confident about themselves in domains that are judged more male-typed, for example, mathematics and science. Controlling for the category difficulty, both men and women tend to underestimate women's ability in domains where the male advantage is significant. Stereotypes and DIM work together to make men more self-confident, while women are less self-confident in male-typed domains.

The announcement of female executives would draw more attention because of their rareness in American society. It is natural for shareholders to be skeptical since female business leaders are new and different. Kanter's (1977) token status theory analyzes gender and gender-role stereotypes in a work context. Kanter creates the term "token status" in reference to the experience of women managers at a time when they are underrepresented relative to their male counterparts. In a more extreme situation, solos, people are the sole representative of their demographic group within an organization.

Men occupy the majority of board seats. In other words, the female representation is still low in the top executive rank. This situation could also exaggerate the gender gap in the board rooms. It has been previously observed that some employers hesitate to hire candidates that are demographically different from the majority of employees (Neckermann & Kirchenman, 1991). This conclusion is transferable to the board

member nomination. Before carrying out the new nomination of a female board member, the nominating committee would concern that if the new female member is the best choice for a male-domain board room. Tolbert and Oberfield(1991) point out that the members of the majority will be uncomfortable, and the dissimilarity will impede trust. The majority of the board members – men - need more effort to build trust relationships with their female peers while the trust between their male peers can be naturally built. All these concerns about female board members' skills and characteristics also give investors a negative impression. At the executive rank, female managers are vulnerable to critical consequences, such as perceptual biases and detrimental stereotypes (Hitt & Barr, 1989; Stroh et al., 1992). Kanter (1977) states that people are likely to misrepresent the role of female managers in token status. They would interpret female managers' contribution by following the femininity characteristics rather than following the qualities fit with managers.

Men are consistently preferred to women for positions within male-typed domains (Eagly et al., 1995). For jobs occupied by one gender, they are likely to be described following the characteristics of that gender. Men occupy the senior management positions earlier than women and took the majority of the positions for these jobs. People believe that the attributes to leadership success are consistent with the masculine. The low ratio of the women in the board room, from another perspective, supports the misconception that women are less qualified in top management positions than their male peers. Shenhav (1992) states that men are assumed to be more qualified than women and have more characteristics associated with leadership. Thus, top female managers would face negative expectations from the market since the positions are inconsistent with gender characteristics. Shareholders might doubt female managers' performance since the feminine qualities are highlighted instead of the leadership qualities.

Previous studies provide two traditional explanations for investment distortions, misalignment of managerial and shareholders' interests (Jensen & Meckling, 1976) and information asymmetry between corporate insiders and the capital market (Myers & Majluf, 1984). Malmendier and Tate (2005) argue that managerial overconfidence could

account for corporate investment distortions. Overconfident managers are more likely to overestimate the returns to their investment projects and view external funds as unduly costly. By using panel data on personal portfolio and corporate investment decisions of *Forbes* 500 CEOs, they classify CEOs as overconfident if they persistently fail to reduce their exposure to company-specific risk. This paper also find that investments of overconfident CEOs are significantly more responsive to cash flow, particularly in equity-dependent firms. Malmendier et al. (2011) find the same result, which argues that managers who believe their firm is undervalued view external financing as overpriced. Such overconfident managers rely less on external financing. According to the research about gender stereotypes, men are more confident about their abilities in male-typed domains. Therefore, male CEOs are more likely to face the problems of investment distortions. Huang and Kisgen (2013) compare corporate finance and investment decisions made by female executives with those made by male executives. The research shows that male executives undertake more acquisitions and issue debt more often than female executives. In terms of return, acquisitions made by firms with male executives have announcement returns approximately 2% lower than those made by female managers, and firms with male executives also have lower announcement debt returns. Besides, female managers are more likely to exercise stock options early, which implies their under-confidence. All of the evidence supports that male executives show relative overconfidence in significant corporate decision making compared with female executives.

2.3 CEO gender, corporate governance

2.3.1 Women in the boardroom

Economic interactions involve some form of risk. The common stereotype is that women are more risk-averse than men, and this stereotype is crucial since it can potentially explain important economic phenomena. Charness and Gneezy (2012) report that women make smaller investments in risky assets than men, and so appear to be financially more risk averse. The laboratory findings combining with empirical findings

from investment decisions developed an important step in understanding the essential features of gender differences in risk-taking.

The gender differences in risk-taking could provide some insights of gender pay gap. Economists have attempted to offer a complete explanation of the gender pay gap for a long time; however, a knowledge gap remains in this research. Manning and Saidi (2010) use data from the British Workplace Employment Relations Survey (WERS), which contains information on the nature of the payment schemes, to show that fewer women in establishments use variable (as opposed to fixed) pay. Similarly, Bernasek and Shwiff (2001) state that women are more conservative investors than men. In the same situation, women take less risk in the allocation of their defined contribution pensions.

Considering the behavioral consistency in corporate finance, it would be worth inspecting how female board members affect boards' performance since they have different risk preference from male board members. Adams and Ferreira (2009) claim that gender diversity has a significant impact on board inputs. Female directors have better attendance performance compared to their male colleagues. The higher the fraction of female directors on the board, the better the attendance record of male directors. Also, women are likely to join monitoring-related committees, such as audit, nominating and corporate governance committees; however, men are likely to sit on compensation committees. A gender-diverse board is more easily monitored, and the compensation is relatively more equity-based. However, this paper concludes that higher gender diversity on boards lead to worsened firm performance. In the previous study (Almazan & Suarez, 2003), researchers state that too much board monitoring can hurt shareholders' interest. Therefore, it would be reasonable to say that gender diversity increases firm value when board monitoring could add to the firm value.

Gender diversity could also impact board output significantly. Using Fama and French valuation framework to measure the level of risk, Francoeur et al. (2008) state that the participation of women in the firm could enhance financial performance. For firms have

high fraction of women officers, they would earn positive and significant abnormal returns in complex environments; however, they do not find evidence that a high proportion of female directors on board could bring positive abnormal returns. Nevertheless, boards with high proportion of female directors still could earn normal market returns. Furthermore, Krishnan and Parsons (2008) investigate how gender diversity in senior management affects earning quality, which is defined as the degree to which reported earnings capture economic reality. There is a positive relationship between gender diversity in senior management and earnings quality. Moreover, companies are likely to have higher stock returns after initial public offerings when they have more female representatives in senior management. Similarly, Carter et al. (2003) find that gender and ethnic diversity of the board is positively associated with firm performance measured by Tobin's Q.

However, some researchers get different conclusions. Sila et al. (2010) examine whether gender diversity affects firms' risk-taking using a sample of US firms from 1996-2010. There is no evidence that female boardroom representation influences equity risk. Ahern and Dittmar (2012) test the impact on firm valuation of mandated female board representation. In 2003, firms face a new law requiring that 40% of Norwegian firms' directors be women; this increase is a significant since only 9% of directors were women at that time. They find that the constraint imposed by the quota caused the stock price to drop significantly after the law was announced. The companies also experienced a large decline in Tobin's Q over the following years. The quota made the boards younger and less experienced, which caused deterioration in operating performance.

It is difficult to find evidence to show whether women make better CEOs since a "glass ceiling" prevents women from advancing to senior positions, and females are highly underrepresented among CEOs of top corporations (Morrison & Von Glinow, 1990; Thomas & Gabarro, 1999). Weber and Zulehner (2010) investigate the relationship between female first hires of start-up firms and business success. Since start-up firms are small and risky enterprises, they are particularly sensitive to managers' decisions. If

there is an effect of gender diversity in leading ranks, we should see it in start-ups. This research document that start-up firms with female first hires show a higher likelihood of survival. Faccio et al. (2016) demonstrate that female CEOs usually manage firms that have lower leverage, less volatile earnings, and more chances to survive than similar firms run by male CEOs. In addition, they also point out transitions from male to female CEOs would lead to an economically and statistically significant decrease in corporate risk-taking. In terms of privately-owned firms in the U.S, there is evidence that supports the conclusion that female-owned firms have lower leverage than male-owned firms. (Cole, 2013)

2.3.2 Banking industry

The environment of the banking industry is different from other industries. Many bank regulations are concerned with moral hazard problems arising from the provision of fixed-rate deposit insurance. For instance, to the extent that the FDIC insures depositors against losses, they would be indifferent to the riskiness of a bank's investment and financing strategies. Thus, bank shareholders would face more significant risk-taking incentives than shareholders of other levered firms. Chen et al. (2005) argue that the results for industrial firms could not necessarily be generalized to the banking industry. Based on the research from Houston and James (1995), the compensation structure in the banking industry differs significantly from the structure in other industries, not only in terms of total compensation but also in terms of the relative importance of the individual elements that comprise total compensation.

Berger et al. (2014) construct a dataset based on the entire population of German bank executive teams from 1994 to 2010. This research indicates that younger executive teams increase risk-taking. Interestingly, the increase in the proportion of female executives also leads to riskier conduct of business. In contrast, if board changes result in a higher proportion of executives have Ph.D. degrees, risk-taking declines.

Previous studies prove that female loan officers are more risk-averse compared to their

male colleagues so that female loan officers could decrease banks' risk-taking (Bellucci et al., 2010; Beck et al., 2010). Further to public-facing loan officer's effect on the bank's risk-taking, upper management also influences risk. Palvia et al. (2015) examine if the gender of the bank's CEO and Chairperson of the board influence the bank's capital ratios and default risk. They use extensive panel data of U.S. commercial banks from 2007 to 2010 since the financial crisis in 2008 is marked with high levels of bank distress and quite a few bank failures, this period would provide a platform to study the effects of female CEOs and Chairpersons on the bank failure. The capital levels of female-led banks are higher, which suggests a more conservative management strategy. Additionally, the empirical results show that female CEOs and Chairwomen are negatively associated with bank failures during the crisis. Regarding the sizes of banks, the smaller female-led banks are more likely to survive. Compared to large banks, those small ones lack the ability to absorb market shocks and under loose regulatory environment. Thus, being conservative is crucial in this case.

In contrast, some research get different conclusions. Based on a sample of 365 banks from the 2007 CRSP-FRB Link file of the Federal Reserve of New York, Adams and Ragunathan (2017) demonstrate that women are not more risk-averse than men in the finance industry. Banks with more female directors do not have a lower risk than other banks during the crisis, but they have better performances than the banks with fewer female directors. Thus, they suggest an alternative policy focus than board gender quotas since diversity is valuable in a crisis.

Saparito, Elam and Brush (2013) study the bank-firm relationship to find the gender's impact on firm owner and bank manager. The three measurements of relationship are trust, satisfaction with credit access and bank knowledge. The sample contains 696 matched firm manager and bank manager pairs. The male-male pairs receive the highest scores among these three categories, while female-female pairs have the lowest scores for each measure. To sum up, previous studies get controversial conclusions about whether and how female officers and CEOs affect banks' risk-taking. Besides, female managers are less trusted by customers compared to their male colleagues in banks.

2.4 Investors' reaction to female directors

Previous literature argues that a gender-diverse board is a positive signal not only for investors but also for employees. A higher fraction of female board members indicates a higher work-force diversity, which is also a competitive advantage of a company (Rose, 2007; Richard, 2000). Using the standard financial event study method, Kang et al. (2010) claim that investors generally hold a positive opinion on the appointment of women directors in Singaporean firms. Generally speaking, Singapore's society has an open mind about higher status women since business leaders and popular press there support the benefits of a gender-diverse board.

Using Kanter's token status theory, Lee and James (2007) investigate societal responses to top executive announcements (including CEO, CFO, COO, President and Executive Vice President) from Factiva searches covering the Wall Street Journal, newswires, newspapers and press releases from 1990 to 2000. They find that investors respond negatively to the announcements of female CEOs. But the reactions are less negatively to the female CEOs who are promoted internally.

2.5 Institutional investor

In 2017, institutional investors held over 80% of the shares of the largest companies in the U.S., such as Apple, J.P. Morgan Chase, Microsoft and Facebook. Different from other types of firms, financial institutions do not make and sell commodities. Clark and Monk (2013) state that human capital, the process of decision making, and the data and information infrastructure and architecture are three intangible assets that financial institutions depend upon. Industries, which are human capital intensive, are characterized have flat hierarchies. This fact gives senior managers a great deal of authority over the production process. Thus, we would like to know more about the institutions' CEOs and their impact on investment decisions.

Back to the last century, if institutional investors were dissatisfied with investee firms' managerial or stock performance, they would simply sell their holdings. With the

increase of institutional holdings, previous studies point out that institutional investors need to choose between exercising monitoring efforts for shared gain and trading for investors' interest (Shleifer & Vishny, 1986; Maug,1998; Kahn & Winton, 1998). For large institutions holding a large number of portfolio stocks, they are more likely to be sensitive to corporate governance mechanisms. One possible explanation is that those mechanisms could be a means for decreasing monitoring costs (Bushee et al., 2013). The study done by Coffee (1991) shows that monitoring has become less costly since institutions hold significant shares of companies.

Chen et al. (2007) construct a cost-benefit framework to investigate institutions monitoring and concluded that institutional investors choose to monitor rather than trade when the monitoring benefits exceed costs. The monitoring could also provide informational advantages that institutions can use to adjust their portfolios. They group the institutional investors that have less willingness to monitor investee firms' management decisions as "grey" institutional investors. This kind of institution mainly focuses on protecting the existing and potential business relationships, so they try to avoid challenging investee firm's decisions. In contrast, the other group of institutional investors, "independent" institutional investors, are not interested in build a business relationship with the investee. If they are not satisfied with corporate performance, they will sell their shares. Using acquisition decisions to reveal monitoring, Chen et al. argue that only independent institutions with long-term investments will specialize in monitoring instead of trading.

Based on the category of institutional investors done by Chen et al. (2007), researchers start investigating different kinds of institutional investors separately. As for independent institutional investors, Francis et al. (2019) conduct the first research to examine if and why activist hedge funds more likely to target female CEOs. They control the differences in firm fundamentals, CEO personal characteristics, and CEO compensation packages, then confirmed that female-led firms are preferred targets. The evidence indicates that the differences in managerial and leadership styles between women and men CEOs lead to the hedge funds' preference for women CEOs. This finding is

consistent with psychology research, which reveals that female managers use strong communication and interpersonal skills to purse the greater good; however, male managers are more likely to be self-centered, risk-taking and aggressive. Francis et al. also state that, after being targeted by activist hedge funds, female CEOs would face a decrease in compensation and increases in pay-for-performance and turnover ratios. Usually women are more vulnerable than their male peers because they are risk-averse and not willing to exercise self-defensive actions.

2.6 Hypothesis development

Female CEOs are rare in the business world. According to the token theory, Kanter (1977) claims that people are likely to misrepresent the role of female managers in token status. Their contribution would be associated with femininity rather than with the qualities fit with managers. And these stereotypes shape our beliefs about the characteristics of different genders: both men and women tend to underestimate women's ability in male-typed domains. Top executive positions have been male-dominated for a long time, so the market would be cautious about female business leaders.

With the increase of institutional ownership in U.S. market, institutions' different traits trigger researchers' interest. Following the category of institutional investors by Chen et al. (2007), we group the type 1 (banks) and type 2 (insurance companies) institutions from Thomson Reuters 13F database as passive institutional investors. The passive institutions' preference is maintaining good relationships with investee firms, so the monitoring cost is high due to the risk of hurting their business with investees. These passive institutions are less willing to monitor investee firms' management. In other words, it is not worthy for them to influence the composition of investee firm's board.

Previous study shows that activist hedge funds, which belong to independent institutional investors, view female CEOs as preferred targets, because women have strong communication and interpersonal skills (Francis et al., 2019). Our research will focus on the passive institutional investors. Comparing to independent institutional investors,

passive institutional investors are less willing to monitor investee firms. That makes one of the female CEOs' characteristics - good at communication, less valuable. Thus, stereotypes that men are assumed to be more qualified than women and have more characteristics associated with leadership, would have greater impact on passive institutions when they make choices. These stereotypes would make female CEOs show more disadvantages compared to male CEOs. So, we have our first hypothesis:

H1: Passive institutions invest more in firms with male CEOs.

Previous studies support that CEOs' characters affect firms' decisions and influence risk-taking behavior (Bertrand & Schoar, 2003; Cronqvist et al., 2010; Cain & Mckeon, 2016). Substantial evidence supports that women are more risk-averse than men (Croson & Gneezy, 2009; Eckel & Grossman, 2002). Considering the behavioral differences between men and women, which have been addressed widely in the psychology literature, it is reasonable to assume that these differences would span across personal and professional situations.

Huang and Kisgen (2013) find that male executives undertake more acquisitions and issue debt more often than female executives. To be specific with the CEO position, the work of Faccio et al. (2016) shows that firms run by female CEOs have lower leverage, less volatile earnings, and a higher chance of survival than similar firms run by male CEOs. Previous studies in this area prove that women are the more risk-averse business leaders than their male peers. In this study, the dependent variable stands for the weight of this S&P 500 company in the institution's portfolio. The smaller the portfolio weight, the less investment made by institution in each investee company, which implies institution diversifies its investment to decrease risk of holdings. Thus, through the change of dependent variable, we are able to investigate the institution's risk preference. Then, we develop our second hypothesis:

H2: Institutions run by female CEOs are likely to invest less in a single investee.

3. Data and research design

3.1 Sample source

Following previous research (Brickley et al., 1988; Cornett et al., 2004; Almazan et al., 2005; Chen et al., 2007), we adopt the classification that the type 1 (banks) and type 2 (insurance companies) institutions belong to the passive investor group. This category is based on the institution's potential business relationship with the invested firm. These passive institutions aim to maintain existing or potential business; therefore, they are less likely to engage in management decisions. In other words, they might not actively monitor the investee firms' managers because of the risk of possibly damaging the business relationship.

To create these classifications, we obtain the institutional holding data from the Thomson Reuters 13F database, which is widely used in research of institutional investors (Chen et al., 2007; Francis et al., 2019). We collect the stock holdings files from this database from 2001 to 2017 and kept data on passive institutions (banks and insurance firms). With such criterion, we retrieve passive institutions' holding information. Next, we gather each year's S&P 500 company list and their accounting information from Compustat Annual Updates – Index Constituents between 2001 and 2017. We match passive institutions with S&P 500 companies through investee firms' tickers in each year.

Once the list of companies is complete, gender and other aspects have to be assigned to each company. To investigate how gender affects institutional investors' decisions, information about CEOs' genders and other characteristics was gathered from BoardEx. Management Diagnostics, Ltd. constructed BoardEx to provide information including personal characteristics, educational background, employment history, social networks and compensation packages. The database contains information about U.S. companies whose market capitalization is larger than $10 million. Finally, to exclude the impact of fundamental differences of a firm's performance metrics on institutional investors, we calculate firm level control variables based on the accounting information of S&P

500 companies from Compustat. Our final sample consist of 27,213 merged institution-firm observations between 2001 and 2017.

3.2 Variable construction

3.2.1 Dependent variable

To investigate how CEO gender affects institutional investment decisions, the institutions' stock holding data is used as the dependent portfolio. The dependent variable portfolio weight represents institutional investors' willingness to invest in different investee firms. We use *i* represents investee firms, *j* stands for institutional investors and *t* shows the year. Equation (1) presents the model to calculate the willingness measure:

$$PORTFOLIO\ WEIGHT_{i,j,t} = \frac{Investment_{i,j,t}}{Total_{j,t}} \quad \text{.....(3.1)}$$

where $Total_{j,t}$ is a institution's portfolio holding in that year. As for the calculation of $Total_{j,t}$, we sum up all the stock holdings in institution's account at market value, which can be expressed as following:

$$Total_{j,t} = \sum_{i=1}^{n} Number\ of\ Shares\ Holding_{i,j,t} * Market\ Value\ of\ Each\ Share_{i,t} \quad \text{.....(3.2)}$$

$Investment_{i,j,t}$ is the investment from one institution to the S&P 500 company in that year, which can be calculated as following:

$$Investment_{i,j,t} = Number\ of\ Shares\ Holding_{i,j,t} * Market\ Value\ of\ Each\ Share_{i,t} \quad \text{.....(3.3)}$$

Larger $PORTFOLIO\ WEIGHT_{i,j,t}$ indicates institutional investor prefer this certain company to others in its account.

3.2.2 Key explanatory variables

To investigate gender's impact on investment decisions, we adopt the most common approach to measure a CEO gender using dummy variables $female_{i,t}$ and $instfemale_{j,t}$ (Lee & James, 2007; Francis et al., 2019). We collect the gender of both S&P 500 firms and passive institutions CEOs from BoardEx. When the investee firm

has a female CEO, $female_{i,t}$ would be 1; otherwise it is 0. For institution with a female CEO, $instfemale_{j,t}$ would be equal to 1, or it would be 0. Previous studies only investigate the gender impact from investee firm; however, how institutions distribute their portfolio would be also be influenced by institutions CEOs' characteristics. Through these two gender dummy variables, we are able to measure their effects on portfolio weight simultaneously.

3.2.3 Control variables

Following the literature, we obtain control variables from both investee firm's and CEO's characteristics, including market vale, total asset, Tobin's Q, sales' growth, ROA, leverage, pay out ratio, research and development intensity, cash holding and CEO's age and nationality. These variables are all important factors that influence institutions' preferences. The details of these variables are shown in the following paragraphs. In addition, two control variables that represent institutions' investment situation have been added into account. *Total* is defined as institution's portfolio value in that year; *num_invest* shows the number of companies that in institution's account. We calculate these two variables using the institutional holding information extracted from the Thomson Reuters 13F database.

Firm Characteristics:

Investors could make their decisions based on firm's fundamentals. Following literature to exclude the impacts of differences among investee firms' fundamentals, we employ market value, total asset, Tobin's Q, sales' growth, ROA, leverage, payout ratio, R&D intensity and cash holdings of investee firms as firm level control variables (Francis et al. 2019). The size of investee firm is controlled through firm market value (natural logarithm of market value). We also adopt market-based measure of firm's performance from Adams and Ferreira (2009) by controlling *Tobin's Q* and *ROA*. Tobin's Q represents the relationship between market valuation and intrinsic value. In our empirical study, we define Tobin's Q as the ratio of market vale of asset to book value of asset.

The market value is the sum of market value of common and preferred stock, short term debt and book value of long-term debt. A higher Tobin's Q is a signal of stock overvaluing, which indicates higher risk with the company. Besides, literature shows that firms with female CEOs have higher Tobin's Q, which indicates female style management enhances firm performance (Dezso & Ross, 2008). The ratio of net income to total assets (ROA) is used as a measure of operating performance. We calculate ROA by dividing net income by total asset of the firm. The higher the ROA, the better the firm's performance. *Leverage* is calculated as the ratio of long-term debt plus debt in current liabilities to shareholders' equity. The increase in leverage will push managers to enhance firm's performance since the creditors would monitor them more closely (Harris & Raviv, 1990).

We also control payout ratio because different dividend policies would affect investor's decision. The *R&D intensity* is calculated by dividing Research & Development expense by total asset. Through this measure, we could control different innovation strategies' impacts. *Cash holdings* would reflect firm's finance policy, so we control cash holdings through dividing cash and short-term investment by total asset. And dummy variable *Invested* equals to 1 if the firm received investment from any institutional investor, which represents institutional ownership. The reason of controlling the presence of institutions is some institutions pressure firms toward diversity, for instance, CalPERS and TIAA-CREF.

CEO characteristics:

CEO's personality has a huge influence on company's decision making and performance (Malmendier et al., 2011). As the purpose of this research is to explore how CEO gender affects investment, we control CEO's age and nationality for both of investee firms and institutions. Previous study assert that younger executive teams increase risk-taking (Berger et al., 2014). While Malmendier and Nagel (2011) argue that older CEOs are more likely to be overconfident because of their long experience in industry. Thus, we control ages of both investee firm CEOs and passive institutions CEOs. Following

Francis et al. (2019), we also incorporate CEO's nationality as a control variable. We create dummy variables *American* and *Inst_american*. When CEO has American citizenship, the dummy variable would be coded as 1; otherwise it is 0. The detail of variable construction is shown in the following table.

Table 3.1 Variable Definition

Variable	Symbol	Definition	Source
Gender of Investee Firm's CEO	female	Dummy variable equals to 1 if target firm's CEO is female	Thomson Reuters 13F; BoardEx
Gender of Institutional Investor's CEO	instfemale	Dummy variable equals to 1 if institution's CEO is female	Thomson Reuters 13F; BoardEx
Number of the companies in account	num_invest	Total number of the companies one institution invests in	Thomson Reuters 13F
Institution's total investment amount	total	Institution's investment amount	Thomson Reuters 13F
Institutional ownership	invested	Dummy variable equals to 1 if S&P 500 firm is invested by institution investor	Thomson Reuters 13F
Market value of investee firm	marketvalue	Natural logarithm of market value	Compustat
Total asset of investee firm	lnat	Natural logarithm of market value	Compustat
Tobin's Q of investee firm	tobinsq	Market Value/ Replacement cost	Compustat
Sales' growth of investee firm	salesgrowth	$Sale_t / Sale_{t-1} - 1$	Compustat
ROA of investee firm	roa	Net Income/ Total Asset	Compustat
Leverage of investee firm	leverage	(Long-term debt total+ debt in current liabilities) / Shareholders' equity-total	Compustat
Pay out ratio of investee firm	payoutratio	(Dividends-preferred+Dividends-common+ Purchase of common and preferred stock)/ Income before extraordinary items	Compustat
Research and development intensity of investee firm	rdintensity	Research & Development expense/Total asset	Compustat
Cash holding of investee firm	cashholdings	Cash and short-term investment / Total asset	Compustat
Age of investee firm's CEO	age	Age of the S&P 500 company's CEO	BoardEx
Nationality of investee firm's CEO	american	Dummy variable equals to 1 if the nationality of S&P 500 company's CEO is American	BoardEx
Age of institution's CEO	instage	Age of the institution's CEO	BoardEx
Nationality of institution's CEO	instamerican	Dummy variable equals to 1 if the nationality of institution's CEO is American	BoardEx

After controlling the firm's and CEO's characteristics, we are able to isolate the impact of a CEO's gender on investment decision making. Table 3.2 presents the summary statistics for all variables. More interestingly, Table 3.3 shows the summary statistics for investee firms that are led by female and male CEOs, respectively.

Table 3.2 Key statistics of the sample

This table presents the summary statistics of the major dependent and independent variables. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year.

Symbol	N	MEAN	STD	MIN	MAX
Portfolio Weight	28,116	0.002	0.004	0	0.167
female	28,116	0.024	0.154	0	1
instfemale	27,191	0.015	0.123	0	1
num_invest	27,191	1987.966	1438.573	111	7582
total	27,191	52,100M	90,300M	320M	386,000M
invested	28,116	0.967	0.179	0	1
marketvalue	26,707	9.731	1.115	5.653	13.580
lnat	28,116	9.780	1.396	5.790	14.761
tobinq	28,061	1.671	1.275	0.047	14.279
salegrowth	28,116	0.082	0.187	-2.648	7.110
roa	28,115	0.069	0.061	-0.747	0.503
Leverage	28,116	1.192	3.500	0	88.370
Payoutratio	28,116	0.759	0.466	0	1.998
Rdintensity	28,116	0.022	0.041	0	0.605
Cashholdings	27,480	0.081	0.082	0	0.632
Age_num	27,844	65.513	7.205	33	96
American	28,116	0.780	0.414	0	1
instage_num	27,191	66.721	5.186	48	96
instamerican	27,191	0.754	0.431	0	1

Table 3.3a Key statistics of the sample – Female-led investee firms

This table presents the summary statistics of the major dependent and independent variables from female CEOs-led firms. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year.

	Female-led Investee firms				
Symbol	N	MEAN	STD	MIN	MAX
Portfolioweight	679	0.0022	0.0034	0	0.0176
female	679	1	0	1	1
instfemale	621	0.0177	0.1320	0	1
num_invest	621	1909.245	1331.711	111	7582
total	621	58,700M	98,900M	355M	386,000M
invested	679	0.9146	0.2797	0	1
marketvalue	648	10.3801	1.0623	6.5146	12.2739
lnat	679	10.1649	1.1513	6.8051	12.3090
tobinq	678	1.8673	1.2642	0.4527	6.8485
salegrowth	679	0.0483	0.1060	-.4922	0.5861
roa	679	0.0833	0.0538	-.0045	0.2417
Leverage	679	1.9768	5.8499	0	65.8383
Payoutratio	679	0.8988	0.3932	0	1.8388
Rdintensity	679	0.0225	0.0432	0	0.3277
Cashholdings	654	0.0961	0.0734	0.0026	0.3705
Age_num	679	62.1532	3.7425	42	71
American	679	0.7482	0.4344	0	1
Instage_num	621	65.5797	5.0910	55	79
instamerican	621	0.6908	0.4625	0	1

Table 3.3b Key statistics of the sample –Male-led investee firms

This table presents the summary statistics of the major dependent and independent variables from male CEOs-led firms. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year.

	Male-led investee firms				
Symbol	N	MEAN	STD	MIN	MAX
Portfolioweight	27,437	0.0020	0.0045	0	0.1667
female	27,437	0	0	0	0
instfemale	26,570	.0154	0.1230	0	1
num_invest	26,570	1989.806	1440.946	111	7582
total	26,570	51,900M	90,100M	320M	386,000M
invested	27,437	0.9683	0.1753	0	1
marketvalue	26,059	9.7144	1.1110	5.6533	13.5799
lnat	27,437	9.7709	1.3996	5.7901	14.7606
tobinq	27,383	1.6665	1.2746	0.0470	14.2788
salegrowth	27,437	0.0827	0.1888	-2.6481	7.1101
roa	27,437	0.0689	0.0615	-1.0007	0.5034
Leverage	27,437	1.1724	3.4188	0	88.3704
Payoutratio	27,437	0.7558	0.4671	0	1.9982
Rdintensity	27,437	0.0216	0.0404	0	0.6048
Cashholdings	26,826	0.0802	0.0816	0	0.6322
Age_num	27,165	65.5974	7.2502	33	96

American	27,437	0.7807	0.4138	0	1
Instage_num	26,570	66.7486	5.1854	48	96
instamerican	26,570	0.7559	0.4296	0	1

According to Table 3.3, female-led S&P 500 firms are associated with higher market value and total assets. Consistent with Dezso and Ross (2008), female-led S&P 500 companies have higher Tobin's Q on average. Female-led firms are also more likely to pay dividends based on their higher payout ratio. For CEO's characteristics, female CEOs are younger compared to male CEOs, which is in line with previous research (Ahern & Dittmar, 2012). These differences between female-led and male-led firms might cause investors' different preferences, so this research control these variables to focus on CEO's gender's effect.

3.3 Research design

Kang et al. (2010) investigate investors reaction to female directors by running regression on cumulative average abnormal return (CAAR). While Francis et al. (2019) test the firm's probability of being targeted by activist hedge funds through employing logit regressions. They use the dummy variable Target to measure hedge funds' investment willingness, which equals 1 if a firm is targeted by at least one hedge fund activist in a given year. We employ two approaches to test our research questions. First, we test how CEO's gender influence institutions investment decisions. Using $Portfolio\ Weight_{i,j,t}$ represents institutional investors' willingness to in different investee firms as dependent variable, through multivariate analysis, we control the characteristics of investee firms and CEOs as well as the investment situations of institutions.

we construct model as following:

$$Portfolio\ Weight_{i,j,t} = \alpha + \beta_1 Female_{i,t} + \beta_2 InstFemale_{j,t} + \beta_3 Num\_Invest_{j,t} + \beta_4 Total_{j,t} + \beta_5 Invested_{i,t} + \beta_6 MarketValue_{i,t} + \beta_7 Asset_{i,t} + \beta_8 TobinQ_{i,t} + \beta_9 SaleGrowth_{i,t} + \beta_{10} ROA_{i,t} + \beta_{11} Leverage_{i,t} + \beta_{12} PayoutRatio_{i,t} + \beta_{13} R\&D\ Intensity_{i,t} + \beta_{14} CashHoldings_{i,t} + \beta_{15} Age_{i,t} + \beta_{16} American_{i,t} + \beta_{17} InstAge_{j,t} + \beta_{18} InstAmerican_{j,t} + \mu \ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

The second approach is to replace one of the key explanatory variable *Female* with *Female ratio*, then run fixed-effect multivariate regression. *Female ratio* is the proportion of female directors at the annual report date selected, which measures gender diversity of firms' boards. This regression could reveal if institutions value the gender diversity of investee firms. For robustness, we divide our sample into two periods: pre-2008 and past-2008, and run regression separately. Comparing the results from those two periods could show whether and how institutions' attitude towards female CEOs changes.

Our dependent variable $Portfolio\ Weight_{i,j,t}$ is censored with range from 0 to 1. Thus, we adopt Tobit regression model. The Tobit model, also called a censored regression model, is designed to estimate linear relationships between variables when there is either left- or right- censoring in the dependent variable. It modifies the likelihood function so that it reflects the unequal sampling for each observation depending on whether the latent dependent variable fell above or below the determined threshold. We also control the year fixed effect considering macro-economic factors vary in years.

Table 3.4 Key statistics of the institutions

Year	Number of Institutions	Average Number of Holdings of S&P 500 companies
2001	35	26.09
2002	36	36.14
2003	41	35.49
2004	40	39.10
2005	39	47.41
2006	33	47.52
2007	32	54.06
2008	32	51.72
2009	35	48.66
2010	37	62.30
2011	90	19.01
2012	86	19.90
2013	95	19.59
2014	84	21.56
2015	79	19.99
2016	72	23.72
2017	68	20.99

Table 3.4 shows the number of institutions from our sample in each year. Table 3.5 presents the Pearson correlation matrix of the variables used in our study.

Table 3.5 Correlation Table

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		portfolioweight	female	instfemale	num_invest	total	invested	marketvalue	lnat	tobinq	salegrowth
(1)	portfolioweight	1									
(2)	female	0.0162*	1								
(3)	instfemale	-0.0271***	0.00346	1							
(4)	num_invest	-0.105***	-0.00969	0.0192**	1						
(5)	total	-0.0553***	0.00951	0.0609***	0.811***	1					
(6)	invested	0.00566	0.00193	0.00155	0.00458	0.00526	1				
(7)	marketvalue	0.518***	0.0911***	0.0216***	-0.133***	-0.0168**	0.00988	1			
(8)	lnat	0.367***	0.0518***	0.0753***	-0.111***	-0.0272***	0.00371	0.719***	1		
(9)	tobinq	0.0706***	0.0301***	-0.0321***	-0.0139*	0.00946	0.00772	0.165***	-0.443***	1	
(10)	salegrowth	0.00499	-0.0226***	0.00499	0.0235***	0.00595	-0.00128	0.0354***	-0.0523***	0.148***	1
(11)	roa	0.127***	0.0374***	-0.0462***	-0.0215***	0.00492	0.0101	0.212***	-0.262***	0.578***	0.119***
(12)	leverage	0.00255	0.0186**	0.00555	-0.00138	0.00297	0.00103	-0.0183**	0.0819***	-0.0495***	-0.0328***
(13)	payoutratio	0.0737***	0.0424***	0.0117	-0.0565***	-0.00202	5.09E-05	0.153***	0.0805***	0.0584***	-0.177***
(14)	rdintensity	0.0432***	0.00588	-0.0220***	0.0128*	0.00904	0.00118	0.0831***	-0.215***	0.449***	0.0700***
(15)	cashholdings	-0.0412***	0.0311***	-0.0296***	0.0359***	0.0301***	0.0111	-0.0540***	-0.337***	0.396***	0.0502***
(16)	age_num	0.0292***	-0.0722***	-0.0715***	0.0114	-0.0963***	-0.0078	-0.0809***	0.00206	-0.0933***	0.0364***
(17)	american	0.0407***	-0.0167**	-0.0409***	-0.00267	-0.0399***	-0.0066	0.0321***	0.128***	-0.132***	0.00761
(18)	instage_num	0.0661***	-0.0318***	-0.126***	-0.290***	-0.495***	-0.0170**	-0.0473***	-0.0319***	-0.00252	0.0593***
(19)	instamerican	-0.0616***	-0.0239***	-0.152***	0.401***	0.229***	-0.00716	-0.151***	-0.126***	-0.00435	0.0380***

		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(11)	roa	1								
(12)	leverage	-0.0676***	1							
(13)	payoutratio	0.146***	0.0236***	1						
(14)	rdintensity	0.118***	-0.0704***	-0.0122	1					
(15)	cashholdings	0.297***	-0.0698***	-0.0272***	0.415***	1				
(16)	age_num	-0.0541***	-0.00937	-0.0738***	-0.102***	-0.136***	1			
(17)	american	-0.0965***	-0.0384***	-0.0208***	-0.102***	-0.0885***	0.282***	1		
(18)	instage_num	-0.0359***	-0.00057	-0.0250***	0.00187	-0.0499***	0.249***	0.110***	1	
(19)	instamerican	-0.0313***	-0.00176	-0.0486***	0.0165**	-0.00275	0.122***	0.0352***	-0.0239***	1
	="* p<0.05	** p<0.01	*** p<0.001"							

4. Results

4.1 Main regression results

As shown in Table 4.1, we test H1 and H2 using the Tobit regression method. These two hypotheses have statistically significant coefficients. We run regression without CEOs' characteristics' control variables, shown in Column 1 of Table 4.1. Both of the regression results for the *female* indicator and *instfemale* indicator are negatively significant. Column 3 represents data once we add CEOs' characteristics' control variables of investee firms and institutions. In this case, we still hold the same conclusion as with Column 1 data. In addition, we control the year fixed effect based on Column 3 data, and this regression result is listed in Column 5, considering that macro-economic factors vary in different years. The regression results for the *female* indicator and *instfemale* indicator are still negatively significant. Then in Column 6, we add firm fixed effect control based on Column 5 data. The coefficient of the *female* indicator is negatively significant at 5%. As *female* is a dummy variable and equals 1 if the investee firm has a female CEO, the coefficient here represents the difference in change of the dependent variable, compared to that of male-led investee firms. Having a female CEO would decrease the investee firm's weight in the institution's portfolio by 0.04%. The negatively significant coefficient shows that the firms with female CEOs are less invested compared to the firms with male CEOs. This regression result supports our first hypothesis: passive institutions regard male CEOs as preferred targets.

Table 4.1 Multivariate Tobit regression on the impact of gender on fraction of institutions' investments

The sample includes all the passive institutions' holding of S&P 500 companies. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year. Independent variables are: female, the dummy variable female equals to 1 if S&P firm's CEO is female.; instfemale, the dummy variable instfemale equals to 1 if institution's CEO is female. The control variables at the institution level are: num_invest, total number of the companies one institution invests in; total, Institution's total investment amount. Control variables at the investee firms' level: marketvalue, natural logarithm of market value; lnat, natural logarithm of total asset; tobinq, Tobin's Q of investee firm; salegrowth, sales' growth of investee firm; roa, ROA of investee firm; leverage, leverage of investee firm; payoutratio, pay out ratio of investee firm; rdintensity, research and development intensity of investee firm; cashholdings, cash holding of investee firm; invested, institutional ownership. The control variables at CEO level: age_num, age of investee firm's CEO; american, nationality of investee firm's CEO; instage_num, age of institution's CEO; instamerican, nationality of institution's CEO

VARIABLES	(1) Portfolio Weight	(2) Portfolio Weight	(3) Portfolio Weight	(4) Portfolio Weight	(5) Portfolio Weight	(6) Portfolio Weight
female	-0.00094***	-0.00094***	-0.00083***	-0.00089***	-0.00067***	-0.00040**
	[-5.63]	[-5.63]	[-4.94]	[-5.48]	[-4.05]	[-1.99]
instfemale	-0.00117***	-0.00117***	-0.00070***	-0.00070***	-0.00038*	-0.00044**
	[-5.69]	[-5.71]	[-3.30]	[-3.35]	[-1.75]	[-2.34]
num_invest	0.00000		-0.00000***	-0.00000***	-0.00000***	-0.00000***
	[0.18]		[-4.81]	[-4.86]	[-8.41]	[-10.68]
total	-0.00000***	-0.00000***	0.00000***	0.00000***	0.00000***	0.00000***
	[-4.89]	[-8.22]	[3.21]	[3.23]	[6.50]	[7.92]
invested	0.00034		0.00091			
	[0.18]		[0.46]			
marketvalue	0.00237***	0.00237***	0.00243***	0.00240***	0.00232***	0.00182***
	[43.26]	[43.36]	[43.80]	[43.95]	[96.65]	[24.03]
lnat	-0.00024***	-0.00024***	-0.00027***	-0.00025***		
	[-4.95]	[-4.95]	[-5.34]	[-4.99]		
tobinq	-0.00027***	-0.00027***	-0.00029***	-0.00028***	-0.00015***	-0.00002
	[-7.49]	[-7.50]	[-7.96]	[-7.83]	[-5.50]	[-0.57]
salegrowth	-0.00037***	-0.00037***	-0.00056***	-0.00054***	-0.00065***	-0.00009
	[-2.60]	[-2.59]	[-3.93]	[-3.86]	[-4.47]	[-0.63]
roa	0.00286***	0.00286***	0.00296***	0.00283***	0.00314***	0.00281***
	[5.18]	[5.19]	[5.37]	[5.23]	[5.94]	[4.45]
leverage	0.00002***	0.00002***	0.00003***	0.00003***	0.00002***	0.00003***
	[3.28]	[3.28]	[3.63]	[3.69]	[3.18]	[3.35]
payoutratio	-0.00012**	-0.00012**	-0.00010*	-0.00009	0.00009	0.00010
	[-2.14]	[-2.15]	[-1.71]	[-1.59]	[1.60]	[1.61]
rdintensity	0.00229***	0.00229***	0.00229***	0.00191***	0.00079	0.00015
	[3.17]	[3.18]	[3.17]	[2.82]	[1.12]	[0.09]
cashholdings	-0.00121***	-0.00121***	-0.00057		-0.00048	-0.00179***
	[-3.38]	[-3.38]	[-1.59]		[-1.36]	[-3.48]
age_num			0.00003***	0.00003***	-0.00002***	-0.00000
			[8.44]	[8.76]	[-4.37]	[-0.39]
american			0.00004	0.00002	-0.00019***	-0.00009
			[0.63]	[0.36]	[-3.01]	[-1.03]

instage_num			0.00007***	0.00007***		
			[12.35]	[12.57]		
instamerican			0.00025***	0.00025***		
			[3.76]	[3.93]		
Year Fixed Effect	No	No	No	No	Yes	Yes
Firm Fixed Effect	No	No	No	No	No	Yes
Constant	-0.01846***	-0.01810***	-0.02633***	-0.02547***	-0.01775***	-0.01530***
	[-9.33]	[-78.22]	[-13.01]	[-53.68]	[-37.08]	[-15.85]
Observations	25,282	25,282	25,038	25,569	25,038	25,038
Adjusted R-squared	0	0	0	0	0	0

t-statistics in brackets

*** p<0.01, ** p<0.05, * p<0.1

Previous research in the banking industry by Saparito et al. (2013) find evidence that women are less likely to be trusted compared to their male peers. Since the bank is a major type of passive institutions, our results confirm that passive institutions have more confidence in male CEOs. People tend to underestimate women's ability in male-typed domains because of the stereotype. The leadership - one of the most important characteristics of CEOs - is believed to be associated with men. Investors would not give female CEOs the same trust as they give to male CEOs and judge female CEOs' performance more harshly. With respect to institutional investors holding huge shares of investee companies, when they target the investees, they need to consider investees' management carefully. Then, the doubt about female CEOs' leadership is highlighted, which makes male CEOs a preferred choice compared to female CEOs. Lee and James (2007) argue that investors respond negatively to the announcements of female CEOs. Our regression results are in line with what they conclude; however, it is in contrast to the conclusion of Francis et al. (2019). The controversy is because we investigate different groups of institutional investors.

The differences between passive institutions' and independent institutions' business nature create their varying preference for investees' CEOs. Activist hedge funds get involved in investee firms' business very closely. Thus, it is vital to enter agreements forcefully. Francis et al. (2019) state that female CEOs are usually willing to have private communication to reach settlements in a non-hostile way since hostile tactics could be very costly to investors as well as investees. More importantly, when a female CEO runs the investee firm, activist hedge funds could get

board seats and let their outside expertise become involved in investee firms' management. Monitoring the composition of the board is an effective way to monitor the investee, so activists hedge funds can reach their stated goals successfully. We can conclude that female CEOs are more attractive to activist hedge funds, as well as other independent institutional investors. Female CEOs' larger network size could benefit independent institutional investors' business, and they are younger with shorter tenure that implies that female CEOs lack bargaining power for compensation. All those characteristics make female CEOs preferred target for independent institutional investors; however, in our case of passive institutions, the story could be relatively different.

The passive institutions have different priorities compared to independent institutional investors. They put maintaining the existing and potential business relationships with investees as their first priority. In other words, monitoring the investee's board by getting board seats or changing CEOs' compensation structures is no longer attractive to them; these actions could even hurt their relationships with investees. Thus, passive institutions need to find reliable CEOs to lead investee firms to make sure they can bring profits to the investment and be open to business cooperation opportunities in the future. Based on male and female stereotypes, passive investors would see male CEOs as more suitable leaders to run the business and put trust in them. The advantages of female CEOs are less valuable under this circumstance because passive institutions do not need to monitor the operation of investee firms through them. To sum up, our negatively significant result is reasonable according to the business nature of passive institutions.

As shown in Column 6, the coefficient of the *instfemale* indicator is negatively significant at 5%. As *instfemale* is a dummy variable and equals 1 if a female CEO runs the institution, this result indicates that female CEOs usually invest smaller proportions of their portfolios in each firm. An institution with a female CEO would decrease the portfolio weight of each investee by 0.044%. This coefficient implies that women are risk-averse and less confident when investing. Our second hypothesis - institutions run by female CEOs are likely to invest less in a single investee - is proved.

For control variables, the coefficient of *market value* is positively significant at 1%, which implies that institutions are more likely to invest more of their portfolio weight to the firms with higher market value. A higher Tobin's Q is a signal of stock overvaluing, which indicates a higher risk with the company. In the regression, the coefficients of *Tobin's Q* are negative. This finding presents that institutions avoid investing in overvalued firms. As for another performance measure, *ROA*, its coefficient is positively significant at 1%. This result implies that passive institutions are willing to put more weight of their portfolio into firms with better performance. More interestingly, the coefficients of *sales' growth* are negative, which shows that firms have strong sales' growth would be less invested by passive institutions. It would be worth understanding passive institutions' reasons for less valuing fast-growing companies.

Bordalo et al. (2019) find that women are much less confident about themselves in male-typed domains. Investing requires mathematical and business skills. These two areas have been considered as domains where the male advantage is significant. Thus, not only men but also women themselves would underrate women's ability when they invest. Meanwhile, male CEOs are likely to be overconfident about their investment decision, so they are willing to take risks. Malmendier and Tate (2005) also show that managerial overconfidence could account for corporate investment distortions. Regarding institutions' huge shareholdings of S&P 500 companies, the difference in risk-taking between male and female CEOs is exaggerated. Female CEOs undertake safe strategies, for example, diversify their holdings to prevent market risk. In contrast, male CEOs choose to believe in their decisions and dare to invest more in an investee once they believe the investee will have excellent performance. In previous studies, we also notice that women are financially more risk-averse, and male executives undertake more acquisitions and issue debt more often than female executives (Charness & Geezy, 2010; Huang & Kisgen, 2013). Our results empirically support that female CEOs prefer to diversify their investment to avoid risk.

4.2 Gender diversity on board

According to our main regression results, we conclude that the investee's CEO gender does influence institutional investors when they invest. Earlier research has shown that gender

diversity has an impact on board inputs, and female board members could improve the effectiveness of boards (Adams and Ferreira, 2009). Then we start wondering if the gender diversity of the investee firm's board would change institutional investors' minds.

To test gender diversity's impact, we replace our *female* dummy variable with *female-ratio*,[6] which is the proportion of female directors at the annual report date selected. Then we run Tobit regression on the impact of female ratio on the portfolio weight of the investee firm. The results are reported in Table 4.2.

[6] Source: BoardEx. We calculate *femaleratio* based on the following equation: *FemaleRatio = 1 – GenderRatio*, which measures the proportion of male board members.

Table 4.2 Multivariate tobit regression on the impact of gender ratio on fraction of institutions' investments

The sample includes all the passive institutions' holding of S&P 500 companies. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year. Independent variables are: femaleratio, the proportion of female directors at the annual report date selected ; instfemale, the dummy variable instfemale equals to 1 if institution's CEO is female. The control variables at the institution level are: num_invest, total number of the companies one institution invests in; total, Institution's total investment amount. Control variables at the investee firms' level: marketvalue, natural logarithm of market value; lnat, natural logarithm of total asset; tobinq, Tobin's Q of investee firm; salegrowth, sales' growth of investee firm; roa, ROA of investee firm; leverage, leverage of investee firm; payoutratio, pay out ratio of investee firm; rdintensity, research and development intensity of investee firm; cashholdings, cash holding of investee firm; invested, institutional ownership. The control variables at CEO level: age_num, age of investee firm's CEO; american, nationality of investee firm's CEO; instage_num, age of institution's CEO; instamerican, nationality of institution's CEO.

	(1)	(2)	(3)	(4)	(5)	(6)
	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio
VARIABLES	Weight	Weigh	Weigh	Weigh	Weigh	Weigh
femaleratio	-0.00193***	-0.00193***	-0.00134***	-0.00129***	0.000299	6.67e-05
	[-6.62]	[-6.62]	[-4.54]	[-4.44]	(0.000293)	(0.000410)
instfemale	-0.00112***	-0.00112***	-0.00067***	-0.00067***	-0.000382*	-0.000451**
	[-5.46]	[-5.46]	[-3.16]	[-3.21]	(0.000214)	(0.000185)
num_invest	-0.00000		-0.00000***	-0.00000***	-2.66e-07***	-2.90e-07***
	[-0.22]		[-4.97]	[-5.02]	(3.12e-08)	(2.69e-08)
total	-0.00000***	-0.00000***	0.00000***	0.00000***	0***	0***
	[-4.41]	[-7.98]	[3.37]	[3.39]	(0)	(0)
invested	0.00023		0.00082			
	[0.12]		[0.42]			
marketvalue	0.00239***	0.00239***	0.00244***	0.00241***	0.00230***	0.00184***
	[43.46]	[43.58]	[43.84]	[43.93]	(2.37e-05)	(7.39e-05)
lnat	-0.00023***	-0.00023***	-0.00026***	-0.00023***		
	[-4.75]	[-4.75]	[-5.16]	[-4.75]		
tobinq	-0.00027***	-0.00027***	-0.00029***	-0.00028***	-0.000157***	-4.43e-05
	[-7.35]	[-7.35]	[-7.83]	[-7.69]	(2.74e-05)	(4.14e-05)
salegrowth	-0.00044***	-0.00044***	-0.00060***	-0.00058***	-0.000616***	-7.47e-05
	[-3.07]	[-3.07]	[-4.22]	[-4.12]	(0.000143)	(0.000136)
roa	0.00276***	0.00276***	0.00290***	0.00275***	0.00296***	0.00267***
	[5.01]	[5.01]	[5.27]	[5.10]	(0.000515)	(0.000621)
leverage	0.00003***	0.00003***	0.00003***	0.00003***	2.24e-05***	2.47e-05***
	[3.49]	[3.49]	[3.75]	[3.82]	(7.17e-06)	(7.58e-06)
payoutratio	-0.00008	-0.00008	-0.00007	-0.00006	9.13e-05*	0.000102*
	[-1.43]	[-1.43]	[-1.26]	[-1.16]	(5.52e-05)	(5.91e-05)
rdintensity	0.00237***	0.00237***	0.00237***	0.00194***	0.000440	0.000201
	[3.29]	[3.29]	[3.30]	[2.86]	(0.000667)	(0.00173)
cashholdings	-0.00132***	-0.00132***	-0.00067*			
	[-3.68]	[-3.67]	[-1.86]			
age_num			0.00003***	0.00003***	-1.72e-05***	-1.18e-06
			[8.13]	[8.52]	(4.08e-06)	(5.01e-06)
american			0.00006	0.00004	-0.000215***	-8.29e-05

			[0.90]	[0.59]	(6.25e-05)	(8.33e-05)
instage_num			0.00007***	0.00007***		
			[12.17]	[12.42]		
instamerican			0.00024***	0.00025***		
			[3.69]	[3.87]		
Year Fixed Effect	No	No	No	No	Yes	Yes
Firm Fixed Effect	No	No	No	No	No	Yes
Constant	-0.01832***	-0.01811***	-0.02608***	-0.02534***	-0.0177***	-0.0159***
	[-9.27]	[-78.31]	[-12.88]	[-53.27]	(0.000467)	(0.000931)
Observations	25,282	25,282	25,038	25,569	25,569	25,569
Adjusted R-squared	0	0	0	0		

t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.1

Using the control variables from investee firms' and CEOs' characteristics, we also control the year fixed effect to exclude the macro-economic factors' effect. The regression result is shown in Column 6. The coefficient of the *femaleratio* is positive but not significant. This coefficient indicates that the proportion of female directors on the board does not influence passive institutions when they invest. One of the reasons behind this phenomenon might be that gender diversity in the board room does not affect the firm's risk-taking. From the study by Sila et al. (2010), they claim that female boardroom representation would not influence equity risk. Therefore, passive institutions might not pay attention to the gender diversity of investees' boards.

Furthermore, based on the U.S. market, gender diversity in board rooms remains low. The percentage of board seats held by women was 16% in 2008 and 22% in 2017.[7] In theory, with the increase of gender diversity, the firms would face problems like taking more time and effort to make an agreement. As a consequence, investors do not need to start worrying about the side products of gender diversity.

Compared to our main regression result, gender diversity on boards is not as important as the CEO gender for the passive institution. Clearly, the CEO is one of the most powerful positions in the firm. Since institutional investors usually hold vast stakes of the investee firms, they need

[7] Source: ISS Analytics

to work with the investee firms' CEOs. It is reasonable for institutional investors to show their preference for different genders CEOs. Nevertheless, gender diversity would not be as significant as the gender of the CEO. Specifically, passive institutions are less willing to monitor investee firms. They do not need to monitor the investee firms' board composition. Our regression results empirically prove that passive institutions would not take gender diversity of investee firms' boards into account.

As shown in Column 6, the other key explanatory variable, *instfemale*, its coefficient is negatively significant at 5%. Our second hypothesis is proved. The firm-level control variables, such as *market value, Tobin's Q, sale's growth* and *ROA*, hold the same results as the main regression results.

4.3 Robustness test

In our robustness test, we first considered to separate our data into two periods, pre-2008 and past-2008. Similar to our main regression, we test H1 and H2 using the Tobit regression method with the same group of control variables. Table 4.3 shows the regression results based on the date from 2001 to 2007.

Table 4.3 Multivariate tobit regression on the impact of gender on fraction of institutions' investments before 2008

The sample includes all the passive institutions' holding of S&P 500 companies from 2001 to 2007. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year. Independent variables are female and instfemale. The dummy variable female equals to 1 if target firm's CEO is female; the dummy variable instfemale equals to 1 if institution's CEO is female. The control variables at the institution level are: num_invest, total number of the companies one institution invests in; total, Institution's total invest-ment amount. Control variables at the investee firms' level: marketvalue, natural logarithm of market value; lnat, natural logarithm of total asset; tobinq, Tobin's Q of investee firm; salegrowth, sales' growth of investee firm; roa, ROA of investee firm; leverage, leverage of investee firm; payoutratio, pay out ratio of investee firm; rdin-tensity, research and development intensity of investee firm; cashholdings, cash holding of investee firm; invested, institutional ownership. The control variables at CEO level: age_num, age of investee firm's CEO; american, nationality of investee firm's CEO; instage_num, age of institution's CEO; instamerican, nationality of institution's CEO.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Portfolio weight	Portfolio weight	Portfolio weight	Portfolio weight	Portfolio weight
female	-0.00108**	-0.00109**	-0.00104**	-0.00102**	-0.00097**
	[-2.55]	[-2.57]	[-2.44]	[-2.43]	[-2.30]
instfemale	-0.00105	-0.00116	-0.00110	-0.00119	-0.00077
	[-1.36]	[-1.51]	[-1.41]	[-1.55]	[-1.01]
num_invest	-0.00000***		-0.00000*	-0.00000*	-0.00000***
	[-2.58]		[-1.90]	[-1.76]	[-3.75]
total	0.00000	-0.00000**	0.00000	0.00000	0.00000***
	[0.92]	[-2.06]	[0.30]	[0.18]	[3.24]
invested	0.00067		0.00076		
	[0.30]		[0.34]		
marketvalue	0.00250***	0.00242***	0.00251***	0.00240***	0.00248***
	[22.90]	[57.94]	[23.00]	[57.50]	[58.17]
lnat	-0.00010		-0.00010		
	[-0.96]		[-1.01]		
tobinq	-0.00003	0.00001	-0.00004	0.00001	-0.00012**
	[-0.39]	[0.25]	[-0.55]	[0.24]	[-2.33]
salegrowth	-0.00094***	-0.00095***	-0.00094***	-0.00095***	-0.00065***
	[-4.23]	[-4.30]	[-4.21]	[-4.39]	[-2.93]
roa	-0.00059	-0.00028	-0.00059	-0.00033	0.00152*
	[-0.63]	[-0.31]	[-0.63]	[-0.38]	[1.68]
leverage	0.00002	0.00002	0.00002	0.00002	0.00002
	[1.50]	[1.29]	[1.54]	[1.35]	[1.62]
payoutratio	-0.00010	-0.00010	-0.00009	-0.00009	0.00015
	[-1.03]	[-0.98]	[-0.87]	[-0.94]	[1.49]
rdintensity	0.00145	0.00163	0.00126	0.00141	0.00140
	[1.07]	[1.21]	[0.92]	[1.09]	[1.04]
cashholdings	-0.00003	0.00006	0.00013		0.00051
	[-0.05]	[0.08]	[0.19]		[0.74]
age_num			0.00001	0.00001	-0.00002***
			[1.07]	[1.12]	[-2.60]
american			-0.00019	-0.00021	-0.00032**

			[-1.29]	[-1.48]	[-2.21]
instage_num			0.00003**	0.00003**	
			[2.52]	[2.57]	
instamerican			-0.00017	-0.00016	
			[-1.21]	[-1.16]	
Year Fixed Effect	No	No	No	No	Yes
Constant	-0.02087***	-0.02067***	-0.02364***	-0.02291***	-0.01926***
	[-9.19]	[-52.00]	[-9.42]	[-21.31]	[-24.91]
Observations	9,621	9,621	9,604	9,794	9,604
Adjusted R-squared	0	0	0	0	0

t-statistics in brackets

*** p<0.01, ** p<0.05, * p<0.1

As shown in Column 5, after controlling for the year fixed effect, the coefficient of the *female* dummy is negatively significant at 1%. This result indicates that firms with female CEOs are less invested compared to the firms with make CEOs. Our first hypothesis, passive institutions regard male CEOs as preferred targets, is proved. Although we get the same conclusion of H1 based on the pre-2008 data, the regression result does not support the second hypothesis. We use the *instfemale* dummy to test our second hypothesis. From Column 5, the coefficient of the *instfemale* dummy is negative but not significant. This result implies that differences between male and female institutions' CEOs would not have any impact when they make an investment decision. The female CEO is an exception in the U.S., especially in earlier years. Besides, the passive institutions, including banks and insurance firms, which are both traditionally male-typed domains. In addition, we have few institutions that were led by female CEOs before 2008. These facts lead to an insignificant regression result for the second hypothesis.

Then we run the regression using data from 2008 to 2017. The results are shown in Table 4.4. After controlling for the year fixed effect, the regression result is listed in Column 5. The coefficient of the *female* dummy is negatively significant at 1%. Having a female CEO would decrease the investee firm's weight in the institution's portfolio by 0.052%. We confirm that passive institution prefers investee firms that have male CEOs. Regarding the second hypothesis, we find that the coefficient of the *instfemale* dummy is negatively significant at 10%. Thus, an institution with a female CEO would decrease the portfolio weight of each investee by 0.035%. Again, we prove the second hypothesis. Based on the data from 2008 to 2017, we obtain the same results as the results have been shown in the main regression Table 4.1, both

of our H1 and H2 are proved.

Table 4.4 Multivariate tobit regression on the impact of gender on fraction of institutions' investments after 2008

The sample includes all the passive institutions' holding of S&P 500 companies from 2008 to 2017. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year. Independent variables are female and instfemale. The dummy variable female equals to 1 if target firm's CEO is female; the dummy variable instfemale equals to 1 if institution's CEO is female. The control variables at the institution level are: num_invest, total number of the companies one institution invests in; total, Institution's total investment amount. Control variables at the investee firms' level: marketvalue, natural logarithm of market value; lnat, natural logarithm of total asset; tobinq, Tobin's Q of investee firm; salegrowth, sales' growth of investee firm; roa, ROA of investee firm; leverage, leverage of investee firm; payoutratio, pay out ratio of investee firm; rdintensity, research and development intensity of investee firm; cashholdings, cash holding of investee firm; invested, institutional ownership. The control variables at CEO level: age_num, age of investee firm's CEO; american, nationality of investee firm's CEO; instage_num, age of institution's CEO; instamerican, nationality of institution's CEO.

VARIABLES	(1) portfolio-weight	(2) portfolio-weight	(3) portfolio-weight	(4) portfolio-weight	(5) portfolio-weight
female	-0.00066***	-0.00065***	-0.00065***	-0.00072***	-0.00056***
	[-3.95]	[-3.89]	[-3.87]	[-4.43]	[-3.40]
instfemale	-0.00090***	-0.00093***	-0.00058***	-0.00066***	-0.00035*
	[-4.71]	[-4.90]	[-2.87]	[-3.34]	[-1.71]
num_invest	-0.00000*		-0.00000***	-0.00000***	-0.00000***
	[-1.65]		[-4.44]	[-4.52]	[-8.77]
total	-0.00000	-0.00000***	0.00000***	0.00000***	0.00000***
	[-1.37]	[-5.04]	[4.02]	[4.05]	[6.85]
marketvalue	0.00217***	0.00203***	0.00226***	0.00203***	0.00219***
	[35.50]	[74.45]	[36.07]	[75.01]	[78.03]
lnat	-0.00015***		-0.00024***		
	[-2.80]		[-4.14]		
tobinq	-0.00044***	-0.00036***	-0.00045***	-0.00034***	-0.00020***
	[-10.64]	[-11.57]	[-10.77]	[-10.90]	[-6.27]
salegrowth	-0.00045**	-0.00045**	-0.00051***	-0.00048**	-0.00062***
	[-2.37]	[-2.40]	[-2.71]	[-2.55]	[-3.12]
roa	0.00750***	0.00818***	0.00691***	0.00758***	0.00495***
	[10.73]	[12.63]	[9.82]	[12.13]	[7.57]
leverage	0.00003***	0.00003***	0.00003***	0.00003***	0.00003***
	[3.14]	[2.83]	[3.35]	[2.98]	[3.21]
payoutratio	-0.00007	-0.00006	-0.00009	-0.00007	0.00007
	[-1.12]	[-0.92]	[-1.33]	[-1.10]	[1.01]
rdintensity	0.00252***	0.00254***	0.00236***	0.00192**	0.00046
	[3.12]	[3.15]	[2.91]	[2.52]	[0.58]
cashholdings	-0.00109***	-0.00098**	-0.00096**		-0.00117***
	[-2.69]	[-2.44]	[-2.37]		[-2.94]
age_num			0.00002***	0.00002***	-0.00002***
			[4.43]	[4.13]	[-3.51]
american			0.00003	-0.00001	-0.00013**

			[0.38]	[-0.09]	[-2.03]
instage_num			0.00006***	0.00006***	
			[8.67]	[8.46]	
instamerican			0.00022***	0.00021***	
			[3.03]	[2.99]	
Year Fixed Effect	No	No	No	No	Yes
Constant	-0.01743***	-0.01780***	-0.02291***	-0.02299***	-0.01643***
	[-59.58]	[-66.67]	[-36.94]	[-37.99]	[-38.97]
Observations	15,661	15,661	15,434	15,775	15,434
Adjusted R-squared	0	0	0	0	0

t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.1

We could find several highlights through the comparison of the regression results from these two periods. Comparing the results in Column 5 from Table 4.3 to that from Table 4.4, the coefficient of the *female* indicator increases from -0.097% to -0.056%. Since the coefficient here represents the difference in change of the dependent variable- portfolio weight, this result indicates that the differences between portfolio weights of investee firms run by different genders' CEOs are getting smaller. Although in both of the periods we find that passive institutions regard male CEOs as preferred targets, passive institutions are becoming less discriminating against the female CEOs. Men occupied top executive positions first and still take the majority of this kind of position. People would assume that men are more qualified than women and have more characteristics associated with leadership (Shenhav, 1992). In the earlier years, the investors did react more negatively to female directors than they did recently. Since the beginning of this century, large publicly traded companies have taken actions to improve the gender diversity on their board, companied by the legislation on equal gender representation in the company, more and more female CEOs appear. This allowed institutional investors to work with investee firms run by women and learn more about the new female business leaders. The market previously rejected female CEOs because of the persisted gender stereotype. Furthermore, the practice of involving more female representatives changes the attitude of the passive institution when they make investment decisions.

Table 4.5 Multivariate Tobit regression on the impact of gender on fraction of institutions' investments (Insurance company)

The sample includes all the passive institutions' holding of S&P 500 companies. The dependent variable, portfolio weight is measured by the institution's holding of one company as a percentage of its total holding in that year. Independent variables are: female, the dummy variable female equals to 1 if S&P firm's CEO is female.; instfemale, the dummy variable instfemale equals to 1 if institution's CEO is female. The control variables at the institution level are: num_invest, total number of the companies one institution invests in; total, Institution's total investment amount. Control variables at the investee firms' level: marketvalue, natural logarithm of market value; lnat, natural logarithm of total asset; tobinq, Tobin's Q of investee firm; salegrowth, sales' growth of investee firm; roa, ROA of investee firm; leverage, leverage of investee firm; payoutratio, pay out ratio of investee firm; rdintensity, research and development intensity of investee firm; cashholdings, cash holding of investee firm; invested, institutional ownership. The control variables at CEO level: age_num, age of investee firm's CEO; american, nationality of investee firm's CEO; instage_num, age of institution's CEO; instamerican, nationality of institution's CEO

VARIABLES	(1) Portfolio Weight	(2) Portfolio Weight	(3) Portfolio Weight	(4) Portfolio Weight	(5) Portfolio Weight
female	-0.00030*	-0.00030*	-0.00031*	-0.00032**	-0.00031*
	[-1.83]	[-1.83]	[-1.86]	[-1.98]	[-1.87]
instfemale	0.00060***	0.00062***	-0.00037	-0.00037	0.00025
	[4.20]	[4.33]	[-0.74]	[-0.75]	[0.55]
num_invest	-0.00000**		-0.00000***	-0.00000***	-0.00000
	[-2.03]		[-2.83]	[-2.83]	[-1.38]
total	-0.00000***	-0.00000***	-0.00000***	-0.00000***	-0.00000
	[-14.84]	[-17.02]	[-14.35]	[-14.50]	[-0.34]
invested	0.00068		0.00063		
	[0.42]		[0.39]		
marketvalue	0.00141***	0.00140***	0.00142***	0.00141***	0.00154***
	[25.60]	[25.56]	[25.62]	[25.78]	[65.12]
lnat	0.00011**	0.00011**	0.00010**	0.00010*	
	[2.18]	[2.19]	[2.01]	[1.96]	
tobinq	-0.00003	-0.00002	-0.00004	-0.00003	-0.00012***
	[-0.79]	[-0.67]	[-0.97]	[-0.75]	[-4.32]
salegrowth	-0.00048***	-0.00045***	-0.00044***	-0.00044***	-0.00032**
	[-3.42]	[-3.18]	[-3.10]	[-3.14]	[-2.25]
roa	0.00095*	0.00091*	0.00102**	0.00103**	0.00125**
	[1.90]	[1.81]	[2.02]	[2.08]	[2.56]
leverage	0.00002**	0.00002**	0.00002**	0.00002**	0.00002***
	[2.12]	[2.16]	[2.07]	[2.09]	[2.65]
payoutratio	-0.00020***	-0.00019***	-0.00020***	-0.00019***	-0.00015***
	[-3.67]	[-3.47]	[-3.61]	[-3.43]	[-2.65]
rdintensity	0.00071	0.00074	0.00060	0.00075	0.00059
	[1.02]	[1.06]	[0.86]	[1.14]	[0.85]
cashholdings	0.00037	0.00029	0.00036		0.00032
	[1.07]	[0.85]	[1.05]		[0.93]
age_num			-0.00000	-0.00000	-0.00001
			[-0.07]	[-0.05]	[-1.38]
american			-0.00004	-0.00004	-0.00003

			[-0.66]	[-0.68]	[-0.46]
instage_num			-0.00005***	-0.00005***	
			[-4.68]	[-4.77]	
instamerican			-0.00073	-0.00073	
			[-1.47]	[-1.47]	
Year Fixed Effect	No	No	No	No	Yes
Constant	-0.01210***	-0.01217***	-0.00743***	-0.00669***	-0.00305
	[-7.23]	[-54.33]	[-3.78]	[-6.15]	[-0.54]
Observations	4,489	4,489	4,445	4,541	4,445
Adjusted R-squared	0	0	0	0	0

t-statistics in brackets
*** p<0.01, ** p<0.05, * p<0.1

Lastly, we run the regression using data of insurance companies' holdings from 2001 to 2017. The results are shown in Table 4.5. After controlling for the year fixed effect, the regression result is listed in Column 5. The coefficient of the *female* dummy is negatively significant at 10%. Having a female CEO would decrease the investee firm's weight in the institution's portfolio by 0.031%. We confirm that passive institution prefers investee firms that have male CEOs. But the regression result does not support the second hypothesis. We use the *instfemale* dummy to test our second hypothesis. From Column 5, the coefficient of the *instfemale* indicator is not significant. One possible explanation is the number of female-led insurance company is too small to get significant result.

5. Conclusion

Based on the institutional ownership data of U.S. S&P 500 companies from 2001 to 2017, this project investigates whether investee firms' CEOs' gender impact passive institutions investment decisions. There is evidence that passive institutions invest greater proportions of their portfolios in firms with male CEOs compared to those with female CEOs. This evidence implies that passive institutions regard male CEOs as preferred targets. This research is the first to investigate passive institutions' preference for CEO's genders. Thus, the research introduces new understanding of passive institutions. The results indicate that the passive institutions with female CEOs invest smaller proportions of their portfolios in each firm. This finding illustrates a systematic bias against investing in female led firms.

With the trend that more companies increase their gender diversity on their board, we also test if investee firms' gender diversity on their board influences passive institutions' choice. There is no evidence that the fraction of female board members affects the portfolio weights, so the result applies strictly to female leadership, and not to female representation. Passive institutions are less willing to monitor investee firms compared to independent institutional investors so that they would pay less attention to the investee firms' board composition.

Comparing the regression results from two periods, pre-2008 and past-2008, the results show that passive institutions are becoming less resistant to female CEOs. With more female CEOs appearing in the finance industry in recent years, passive institutions' attitude towards female CEOs is changing.

This research has some limitations as it is hard to control for the fundamental differences of the passive institutions. The differences among these institutions might cause their different investment decisions; however, this effect can not be excluded in this paper. As for further research, firstly, the investee firm's sample should be expanded to S&P 1500 listing firms, which could provide broader coverage of the U.S. stock market. Secondly, it is worth investigating whether and how transitions from male to female CEOs impact institutional investors when they invest.

This research was designed to contribute to the following areas. First, this paper enriches the understanding of institutional investors. The results suggest that passive institutions regard male CEOs as preferred targets. One possible explanation for this phenomenon is that people tend to underestimate women's ability in male-typed domains because of stereotypes. Next, these findings can help institutions know the varying needs of different types of institutional investors, while providing investors with a deeper understanding of female CEOs as well as supporting new regulations with a theoretical background. Last but not least, the results confirm that female CEOs are more risk-averse compared to their male peers.

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